Current Zoology, 2020, 66(3), 331–332
doi: 10.1093/cz/zoz043
Advance Access Publication Date: 20 September 2019
Letter to Editor

Letter to Editor

Can the host phylogeny (Chiroptera) influence the community of ectoparasite flies (Diptera)?

Rayanna H. S. Bezerra * and Adriana Bocchiglieri

Universidade Federal de Sergipe, Programa de Pós-graduação em Ecologia e Conservação, Laboratório de Mastozoologia, Cidade Universitária Prof. José Aloísio de Campos, São Cristóvão, SE, Brazil

*Address correspondence to Rayanna H. S. Bezerra. E-mail: rayhellem@hotmail.com

Handling editor: Zhi-Yun Jia

Received on 30 June 2019; accepted on 30 August 2019

Among the factors that may influence parasitism are ecological and phylogenetic aspects (Krasnov et al. 2005), where a host species may acquire a parasite by contact with other hosts co-occurring in a given environment or because of its ancestor (Hoberg and Brooks 2008). Thus, the parasite community can be considered a reflection of the ecological characteristics and the phylogeny of the host (Krasnov et al. 2005). It is possible, in some situations, to observe a greater influence of the phylogenetic history of the host than others factors on parasite composition (Krasnov et al. 2012). As indicative of ancient evolutionary history and congruent phylogenies between the parasite and host species, the degree of specificity may be a result of host adaptation processes and their phylogeny (Dick and Gettinger 2005). Thus, from an ecological perspective, specificity indicates the diversity of resources that the parasite uses while in an evolutionary perspective indicates the historical associations of the parasite–host relationship (Hoberg and Brooks 2008). However, this coevolution may not be evidenced (Graciolli and Carvalho 2012). The phylogenetic distance of the host may influence the parasite composition, because a host can inherit parasitic species from its ancestor during speciation (Krasnov et al. 2005). Phylogenetically close hosts would share many characteristics due to common ancestry, having more similarity in ecological, physiological, and immunological aspects than phylogenetically distant hosts (Krasnov et al. 2014). Thus, it is possible to observe that, with the reduction of the phylogenetic distance between host populations, there is an increase in the similarity of the composition of the parasite community (Krasnov et al. 2014). In this context, we proposed to determine whether phylogenetically close bats share more species of parasites because of the greater ecological similarity between the hosts.

The relationship between 24 species of phyllostomid bats and 37 species of streblids flies was obtained (see Supplementary Material, List of references). The bats recorded are distributed among the genus *Artibeus* ($S = 5$), *Carollia* ($S = 3$), *Anoura*, *Lophostoma*, and *Phyllostomus* (all with $S = 2$), *Chrotopterus*, *Desmodus*, *Diaemus*, *Diphylla*, *Glossophaga*, *Platyrrhinus*, *Sturnira*, *Tonatia*, *Trachops*, and *Uroderma* (all with $S = 1$; Supplementary Figure S1). In relation to parasites, the species registered are distributed among the genus *Trichobius* ($S = 13$), *Strebla* ($S = 9$), *Aspidoptera* ($S = 3$), *Anastrebla*, *Mastoptera*, *Megistopoda*, and *Paratrichobius* (all with $S = 2$), *Exastinion*, *Metelasmus*, *Speiseria*, and *Trichobioides* (all with $S = 1$; Supplementary Figure S2). The similarity in the composition of the ectoparasite community associated with the nearest phylogenetic hosts did not differ from that expected by chance (Mantel = −0.19, $P = 0.15$; Figure 1). The species of parasites classified as polixenes in this study (34.4%) were also not associated with phylogenetically closer hosts (Mantel = −0.24, $P = 0.2$).

For the phylogeny, the parasites are expected to explore phylogenetically closer hosts because of their greater similarities (Krasnov et al. 2014). Considering that phylogenetic proximity may represent ecological, behavioural, and similar immunological defense among the nearest hosts, the parasite could have lower energy expenditure in the process of adaptation to hosts with similar immune defense (Poulin and Mouillot 2004). However, in contrast to previous studies with other vertebrate groups (Krasnov et al. 2005; Krasnov et al.

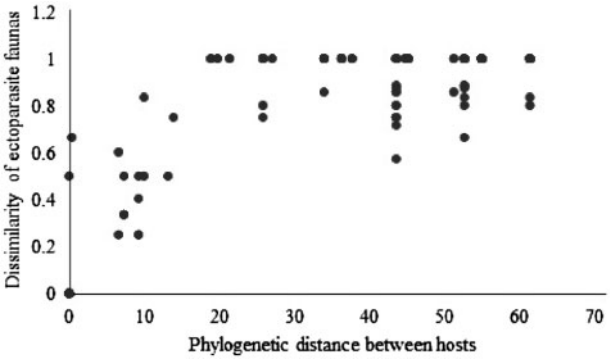

Figure 1. Relationship between dissimilarity of ectoparasite flies and phylogenetic distance between bats hosts.

2010), in this study, phylogenetically closer hosts showed no similarity in the composition of the ectoparasite community. The absence of an observed relationship may be associated with the high specificity of the parasites, since 65.6% of the analyzed parasites were considered monoxenes, that is, they occurred in only one host species. Generally, the specificity may explain the changes found in the parasite communities, and sometimes the parasite distribution pattern tends to vary according to its host specificity (Poulin et al. 2011). This specificity is considered indicative of ancient evolutionary history and congruent phylogenies between the parasite and host species and may be the result of an adaptation among these, where the parasites would have a low survival capacity in an unusual host (Dick and Gettinger 2005). The degree of specificity may vary widely between parasite species, where some parasites being highly specific (monoxenes) and others highly opportunistic (polixenes). However, opportunistic parasites tend to vary their abundance in the different hosts, being higher in the main host (Poulin and Mouillot 2004). For other groups of parasites, the use of distant hosts may be common (Krasnov et al. 2012). This association may occur due to the lack of host-specific defensive behaviors, such as the immune response. Immune defenses would be more similar between phylogenetically close hosts (Poulin and Mouillot 2004) and may make it more advantageous to parasitize a distant host whose immune defense against such a parasite would not be as effective (Krasnov et al. 2007). Another aspect that could influence this association is the occurrence of a particular host in that region where, in the absence of the main host, it could be replaced by a secondary host. Therefore, a parasite can be considered specific on a local and opportunistic scale on a larger scale broad (Krasnov et al. 2010). The absence of a relationship between the composition of the ectoparasite community and host phylogeny suggests that the structure of the parasite community is being influenced by other factors not analyzed here, such as environmental characteristics, age, reproductive stage, type of shelter of the host, and mobility of the parasite. Thus, to better understand such interactions, it is necessary to analyses both the ecological aspects and the evolutionary history between parasite–host that may be acting on the parasite composition.

Supplementary Material

Supplementary material can be found at https://academic.oup.com/cz.

Conflict of Interest

None declared.

Acknowledgments

We are grateful to Dr Sidney Feitosa Gouveia (UFS) for assistance in carrying out the preliminary analyses.

Funding

We are grateful to the Universidade Federal de Sergipe (PROAP/CAPES/UFS) for logistical support. This study was financed in part by the Coordenação de Aperfeiçoamento de Pessoal de Nível Superior—Brasil (CAPES)—Finance Code 001.

References

Dick CW, Gettinger D, 2005. A faunal survey of streblid bat flies (Diptera: Streblidae) associated with bats in Paraguay. *J Parasitol* **91**: 1015–1024.

Graciolli G, Carvalho CJ, 2012. Do fly parasites of bats and their hosts coevolve? Speciation in *Trichobius phyllostomae* group (Diptera, Streblidae) and their hosts (Chiroptera, Phyllostomidae) suggests that they do not. *Rev Bras Entomol* **56**:436–450.

Hoberg EP, Brooks DR, 2008. A macroevolutionary mosaic: episodic host-switching, geographical colonization and diversification in complex host-parasite systems. *J Biogeogr* **35**:1533–1550.

Krasnov BR, Korine C, Burdelova NV, Khokhlova IS, Pinshow B, 2007. Between-host phylogenetic distance and feeding efficiency in haematophagous ectoparasites: rodent fleas and a bat host. *Parasitol Res* **101**: 365–371.

Krasnov BR, Mouillot D, Shenbrot GI, Khokhlova IS, Vinarski MV et al., 2010. Similarity in ectoparasite faunas of Palearctic rodents as a function of host phylogenetic, geographic or environmental distances: which matters the most? *Int J Parasitol* **40**:807–817.

Krasnov BR, Mouillot D, Khokhlova IS, Shenbrot GI, Poulin R, 2012. Compositional and phylogenetic dissimilarity of host communities drives dissimilarity of ectoparasite assemblages: geographical variation and scale--dependence. *Parasitology* **139**:338–347.

Krasnov BR, Mouillot D, Shenbrot GI, Khokhlova IS, Poulin R, 2005. Abundance patterns and coexistence processes in communities of fleas parasitic on small mammals. *Ecography* **28**:453–464.

Krasnov BR, Pilosof S, Stanko M, Morand S, Korallo-Vinarskaya NP et al., 2014. Co-occurrence and phylogenetic distance in communities of mammalian ectoparasites: limiting similarity versus environmental filtering. *Oikos* **123**:63–70.

Poulin R, Krasnov BR, Mouillot D, Thieltges DW, 2011. The comparative ecology and biogeography of parasites. *Philos T R Soc* **366**:2379–2390.

Poulin R, Mouillot D, 2004. The relationship between specialization and local abundance: the case of helminth parasites of birds. *Oecologia* **140**: 372–378.